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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
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PROJECT: TELESAT-A

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NASA TO LAUNCH CANADIAN COMMUNICATIONS SATELLITE

The first in a new series of Canadian domestic communications satellites, TELESAT-A, will be launched by NASA for Telesat Canada aboard a Delta rocket from Kennedy Space Center, Fla., no earlier than November 9.

The satellite, named "Anik" (Eskimo for brother) will be positioned over the equator at 109 degrees West Longitude (straight south of Gallup, New Mexico). A second satellite will be launched four to six months later and will be positioned at 114 degrees West Longitude (straight south of Yuma, Arizona). A third satellite will be used as back-up if necessary.

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TELESAT will act as a space repeater capable of receiving transmission from Earth stations and retransmitting them to other Earth stations in Canada. Each of the satellites will be able to accommodate ten color television channels or up to 9,600 telephone circuits.

The Delta 92 vehicle will place the satellite into a highly elliptical orbit ranging from 196 to 62,301 kilometers (122 to 38,714 statute miles). After checkout and reorientation of the spacecraft, a solid propellant rocket motor aboard TELESAT-A will be fired to circularize the orbit at synchronous altitude (36,800 kilometers or 22,300 miles). At this altitude the speed of the spacecraft in orbit matches the rotational speed of Earth so that it appears to hover over one spot. By the firing of small gas jets aboard the spacecraft it can drift in orbit and then be positioned accurately at any desired stationary point above the equator.

NASA is reimbursed by Telesat Canada for costs of the Delta launch vehicle and launch services. Telesat Canada was officially established by Act of Parliament on September 1, 1969, to own and operate Canada's Domestic Satellite Communications System.

The Delta launch vehicle project is managed for NASA's Office of Space Science by the Goddard Space Flight Center, Greenbelt, Md. Launch services are provided by NASA's Kennedy Space Center, Fla. McDonnell Douglas Astronautics Company, Huntington Beach, Calif., is the Delta Vehicle prime contractor. Hughes Aircraft Company, Culver City, Calif., built the ANIK spacecraft for Telesat Canada.

(END OF GENERAL RELEASE; BACKGROUND INFORMATION FOLLOWS)

THE SPACECRAFT

The TELESAT communications satellites are about 1.8 meters (six feet) in diameter, stand about 3.3 meters (11 feet) tall and will weigh about 270 kilograms (600 pounds) in orbit. The electronics system will be powered normally by some 23,000 solar cells, with sufficient on-board battery capability to provide power to maintain service at full capacity during Sun eclipse of the solar cells, which occurs when the Moon or Earth are positioned between the satellite and the Sun for predictable short periods.

The anticipated life of the Anik spacecraft is seven years. To guarantee a high survivability and long space lifetime, virtually all electronics, guidance, and power systems are duplicated, and all satellites parts and materials have undergone multiple rigid qualification and testing procedures.

The satellite communications system provides for 12 channels of communication, two of which will be protection channels for the ten traffic-carrying channels. Up-link transmission is in the 6 GHz band and the down-link transmission in the 4 GHz band. Telemetry, tracking, and command functions required for satellite station-keeping and positioning are also provided in these frequency bands.

The satellite will be positioned in two orbit positions, coordinated internationally and maintained within plus or minus 64 kilometers (40 statute miles) of the assigned locations. Periodic firing of small thrusters is required to compensate for drifting of the spacecraft.

The analysis and command data for establishing and maintaining the orbital positioning will be carried out by Telesat's Satellite Control Center at the corporation's head office in Ottawa. The actual tracking, and transmission and reception of data, will be provided at Telesat's main Earth station near Allan Park, Ontario, some 130 kilometers (80 statute miles) west of Toronto.

THE DELTA LAUNCH VEHICLE

The TELESAT-A launch will be the 92nd in the long and varied list of Delta missions since the balloon, Echo 1, was successfully orbited in 1960. Of the 91 launches to date, 83 have been successful.

Delta 92 will look considerably different from previous Deltas which were tapered at the joint of the first and second stage. This is the first launch of the Delta "Straight Eight" launch vehicle, so called because the diameter is eight feet across for all three stages including the fairing. The larger diameter fairing will allow Delta to launch the new generation of larger volume spacecraft. The flight will also be the first with nine solid-fuel thrust augmentation rockets from Cape Kennedy. ERTS-1 launched from the Western Test Range last July used nine solids.

The long and successful history of Delta has been one of continued change to handle larger spacecraft and more demanding orbits. For instance, in 1960 Delta was capable of placing 45 kilograms (100 pounds) into a synchronous transfer orbit. Today's Delta can boost 567 kilograms (1,250 pounds) into the same orbit.

General characteristics of Delta #92 for the TELESAT-A mission are:

Total Height:	35 meters (116 feet)
Total Weight:	133,712 kilograms (295,000 pounds)
Body Diameter (not including solids):	2 meters (8 feet)
Total thrust:	3,306,300 newtons (743,000 pounds thrust)

Delta 92's first stage is a modified Thor Booster powered by an engine using liquid oxygen and RJ-1 (kerosene).

The second stage is powered by a liquid-fuel, pressure-fed engine in which the propellants are nitrogen tetroxide (N_2O_4) for the oxidizer and aerozine 50 for the fuel.

Guidance

The all-inertial guidance system (DIGS), using an inertial measurement unit (adapted from the Apollo Lunar Excursion Module and a guidnace computer (adapted from the Centaur launch vehicle program), controls the vehicle and sequence of operations from lift-off to spacecraft separation.

The Flight

The Thor main engine and six of the nine solids will ignite simultaneously on Launch Complex 17, Pad B. The remaining three solids will ignite at 39 seconds after lift-off some five kilometers (three statute miles) above Cape Kennedy.

The second stage will ignite at 4 minutes 31 seconds after lift-off to place the vehicle into an elliptical parking orbit with a perigee (closest point to Earth) of 164 kilometers (102 miles) and an apogee (farthest point from Earth) of 217 kilometers (135 miles).

The third stage will ignite 23 minutes 35 seconds after lift-off at an altitude of 195 kilometers (121 miles), placing the spacecraft into the final transfer orbit to synchronous altitude.

Shortly after third stage burnout, a spring system aboard the Delta will separate TELESAT from the burned out third stage.

On the seventh apogee, approximately four days after launching, a solid propellant rocket motor aboard the spacecraft will be fired to circularize TELESAT-A's orbit at synchronous altitude above the equator. The spacecraft will then begin to drift eastward about three degrees daily until it arrives at its final destination 109 degrees West Longitude, 0 degrees Latitude. Gas jets aboard the spacecraft will stop the spacecraft's drift and Anik will be on station ready for communications checkout some 16 days after being launched. Commercial operation is scheduled to begin by January 1, 1973.

LAUNCH OPERATIONS

Assembly, checkout and launch activities are directed by the Kennedy Space Center Unmanned Launch Operations Directorate.

A team of engineers, technicians and scientists from government, industry and TELESAT Canada have been preparing the space vehicle for launch since major hardware components began arriving at Kennedy Space Center in mid-September.

Following initial checkout in a hangar on Cape Kennedy, the first stage of the Delta launch vehicle was erected at Launch Complex 17 on September 27. After the second and third stages were mated to the booster, a simulated flight test was conducted to ensure the readiness of the launch vehicle.

The spacecraft arrived at Kennedy Space Center in October and was taken to a hangar on Cape Kennedy where a series of performance checks were conducted. Following the launch vehicle simulated flight test, the spacecraft will be taken to the launch pad where it will be erected atop the launch vehicle.

MAJOR DELTA 92/TELESAT-A FLIGHT EVENTS

EVENT	TIME	ALTITUDE	VELOCITY (Kilometers Per Hour)
First Solid Motor Burn-out (six solids)	T plus 39 sec.	5 km (3 s.m.)	2151 km/HR (1336 mph)
Three Solid Motors Ignite	T plus 39 sec.	5 km (3 s.m.)	2172 km/HR (1350 mph)
Second Solid Motor Burnout (three solids)	T plus 1 min. 17 sec.	19 km (12 s.m.)	3423 km/HR (2127 mph)
Solid Motor Separation (all nine solids)	T plus 1 min. 25 sec.	22 km (14 s.m.)	3631 km/HR (2257 mph)
Main Engine Cut Off (MECO)	T plus 4 min. 18 sec.	103 km (64 s.m.)	18,325 km/HR (11,386 mph)
Vernier Engine Cut Off (VECO)	T plus 4 min. 24 sec.	109 km (68 s.m.)	18,329 km/HR (11,389 mph)
Stage I, Stage II Separation	T plus 4 min. 26 sec.	111 km (69 s.m.)	18,325 km/HR (11,386 mph)
Stage II Ignition	T plus 4 min. 31 sec.	114 km (71 s.m.)	18,302 km/HR (11,373 mph)
Jettison Fairing	T plus 4 min. 55 sec.	130 km (81 s.m.)	18,653 km/HR (11,591 mph)
Second Stage Engine Cut Off (SECO)	T plus 9 min. 54 sec.	175 km (109 s.m.)	28,123 km/HR (17,475 mph)
Stage III Ignition	T plus 23 min. 35 sec	195 km (121 s.m.)	28,040 km/HR (17,422 mph)
Third Stage Engine Cut Off (TECO)	T plus 23 min. 79 sec	196 km (122 s.m.)	36,913 km/HR (22,936 mph)
Spacecraft Separation	T plus 26 min.	245 km (152 s.m.)	36,759 km/HR (22,841 mph)

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